

The Chemical Nature of Matter

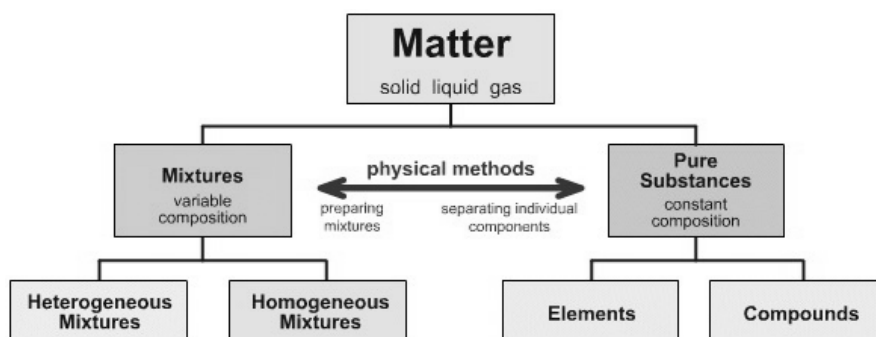
7-5 The student will demonstrate an understanding of the classifications and properties of matter and the changes that matter undergoes. (Physical Science)

7-5.2 Classify matter as element, compound, or mixture on the basis of its composition.

Taxonomy level: 2.3-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have been introduced to the concept of mixtures in 5th grade (5-4.3). In 5th grade (5-4.4), students separated mixtures using the processes of filtration, sifting, magnetic attraction, evaporation, chromatography, and floatation. Students have not been introduced to the concept of elements or compounds in previous grades. Students will further develop the concepts of elements, compounds, and mixtures in high school Physical Science (PS-3.4).

It is essential for students to know that matter can be classified on the basis of its composition:



Elements

- Elements are pure substances that cannot be changed into simpler substances.
- Elements are composed of one kind of atom.

Compounds

- Compounds are pure substances that are composed of two or more types of elements that are chemically combined.
- Compounds can only be changed into simpler substances called elements by chemical changes (7-5.10).
- One way that two or more atoms can combine is to form a *molecule*.

Mixtures

- Mixtures are composed of two or more different substances that retain their own individual properties and are combined physically (mixed together).
- Mixtures can be separated by physical means (filtration, sifting, or evaporation).
- Mixtures may be heterogeneous or homogeneous.
 - In a *heterogeneous mixture*, which is not uniform throughout, the component substances can be visibly distinguished.
 - In a *homogeneous mixture*, which is uniform throughout, the substances are evenly mixed and cannot be visibly distinguished. The particles of the substances are so small that they cannot be easily seen. Another name for a homogeneous mixture is a solution.

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It is not essential for students to know that molecules are the smallest part of covalent compounds. It is not essential for students to understand isotopes. Students do not need to physically separate mixtures as this was done in 5th grade.

Assessment Guidelines:

The objective of this indicator is to *classify* matter as element, compound, or mixture on the basis of its composition; therefore, the primary focus of assessment should be to categorize matter depending on its composition. However, appropriate assessments should require students to *recognize* the classifications of matter based on composition; *exemplify* matter based on its composition; *illustrate* with words, pictures, or diagrams categories of matter; *infer* the types of matter based on characteristics; *compare* the types of matter based on their characteristics; or *summarize* the properties of the three types of matter.